IMAGING: NON-INVASIVE

Tuesday, October, 13, 2015, 4:00 PM-6:00 PM

Abstract nos: 320 - 333

TCT-320

3D-Cardiac-gated Contrast-enhanced Multidetector Computed Tomography (3D-CCCT) Analysis Of The Native Mitral Valve

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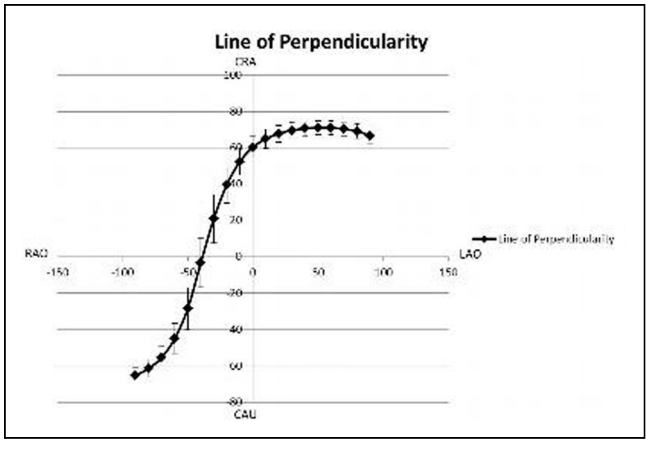
BACKGROUND Novel minimally invasive mitral valve interventions for dysfunctional mitral bioprosthesis are being performed through the apex of the left ventricle. This Transapical approach is also being developed to replace diseased native mitral valve using new generations of catheter-mounted prosthesis. These procedures are imaging-guided in the main and do not permit direct visual assessment of the mitral valve. We postulate that Cardiac-gated Contrast-enhanced Multidetector Computed Tomography (CC-MDCT) imaging of the mitral prosthesis or native mitral valve can be accurately performed, and yields useful information to enhance procedural success.

METHODS Fifty patients that have undergone CC-MDCT assessment of the aortic valve for consideration of the Transcatheter Aortic Valve Replacement (TAVR) procedure were studied. CT data sets were acquired in standard DICOM 3 format, on a 320 detector MDCT scanner using a full retrospective protocol. 100ml of omnipaque 350 non-ionic contrast were used at variable flow rates of 3.5-5ml per second. Images were reconstructed at 0.5mm thickness. A 3-dimensional (3D) image processing software was used to analyze the images. The mitral annulus is viewed at the plane of the leaflet hinge-points. This reference plane is locked so that all subsequent planes remain orthogonal to each other. A corresponding 3D reconstruction of the mitral valve is then reconstructed. The native mitral valve was 'sized', and the fluoroscopic angle of the true profile view of the mitral annulus or "line of perpendicularity" (LP) was established.

RESULTS The mitral valve was 'sized' showing a mean mitral annular area (a) of 792.7 ± 183.3 mm, mean perimeter (b) of 114.3 ± 10.9 mm, and mean maximum annular diameter (e) of 35.9 ± 3.5 mm in systole. Interestingly, an 11.5 ± 13.4% increment in minimum annular diameter (d) during diastole from systole was observed. The LP of the mitral annulus representative of 50 patients (expressed as mean with standard deviation) was generated.



CONCLUSIONS The proposed method of 3D analysis of the native mitral valve on CC-MDCT scan can accurately 'size' and predict the LP of the mitral annulus. The protocol was simple and reproducible. Accurate prosthesis sizing selection and the prediction of the coaxial implant angle during the procedure potentially reduce radiation exposure and improve procedural success.

CATEGORIES IMAGING: Non-Invasive
KEYWORDS C-arm CT, Line of Perpendicularity, Mitral valve

TCT-321

Peripheral MicroRNAs May Serve As Novel Biomarkers For Identification Of Coronary Artery Calcification

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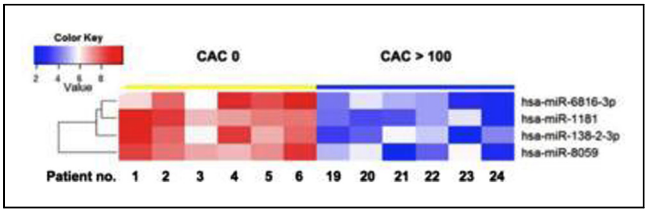
BACKGROUND Standard risk stratification methods are incapable of identifying many individuals subsequently experiencing major adverse cardiovascular events (MACE). Coronary artery calcification (CAC) is a powerful predictor of MACE however the routine use of this technique is limited by radiation exposure and cost. MicroRNAs are small, non-coding RNAs that regulate transcription. Their dysregulation is widely accepted to signify a number of disease states. We aimed to establish whether a peripheral blood-based microRNA profile was predictive of the presence and degree of human CAC.

METHODS Study subjects met the following inclusion criteria: attendance for routine cardiac computed tomography; 18-65 years of age; no established coronary artery disease, cardiac failure or tachyarrhythmia; no renal impairment; no diabetes mellitus; no autoimmune disease; no infection; no active cancer. Peripheral venesection was undertaken and an Agatston score was derived using default software. Leukocyte RNA was isolated with the LeukoLOCK Total RNA Isolation System and stored at -80°C until Toray's microarray analysis was performed.

RESULTS Twenty-four eligible participants entered into the study (mean age 54 years; 67% male). They were categorized by CAC score: [CAC score 0] n=6; [CAC score 1-10] n=6; [CAC score 11-100] n = 6; [CAC score > 100] n = 6. The groups had similar baseline clinical characteristics according to age, gender and prior history of hypertension, dyslipidemia and smoking. MiR-1181 was expressed significantly less in all case groups compared to controls: [CAC 1-10] effect size (ES) = 1.76, p = 0.012; [CAC 11-100] ES = 1.74, p=0.013; [CAC > 100] ES = 3.86, p < 0.01. Additionally there was significant down-regulation of miR-138-2-3p, miR-6816-3p and miR-8059 in those with a CAC score > 100 compared to controls (ES = 3, p < 0.001; ES = 2.87, p < 0.001; ES = 2.6, p = 0.001 respectively); figure 1.

CONCLUSIONS Human blood-based miRNA-1181 appears to predict the presence and degree of CAC. Likewise miR-138-2-3p, miR-6816-3p and miR-8059 are differentially expressed in patients with high CAC scores in comparison to their matched controls. We plan to test these findings further with quantitative real-time PCR and in a prospective validation cohort. Ultimately a miRNA signature may explain the mechanisms underpinning CAC and could serve as a novel, and long-awaited, biomarker for MACE.



CATEGORIES OTHER: Genomics / Proteomics
KEYWORDS Biomarker, Coronary artery calcification

TCT-322

Utility of J-Chronic Total Occlusion (CTO) Score as a Predictor of Successful Percutaneous Coronary Intervention of CTO: Comparison of Coronary Computed Tomography and Coronary Angiography

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BACKGROUND Coronary computed tomography angiography (CCTA) has emerged as an important modality in the diagnostic assessment of chronic total occlusion (CTO). The aim of this study was to evaluate